Notes on Some Western Australian Chitons (Polyplacophora), with Additions to the Fauna and the Description of a New Species of *Rhyssoplax*.

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Plate VIII.

Visiting Western Australia in connection with the Congress of the Royal Australian Ornithologists' Union, in October, 1920, I determined to take the opportunity of visiting Ellensbrook, in the south-west corner of that State, during the series of low tides at the end of the month.

Dr. W. G. Torr had done some excellent collecting at that locality at the end of December, 1910, obtaining single examples of two striking and new forms which he described under the names of *Ischnochiton verconis* and *Tonicia hullianus*. It was in the hope of refinding these, and possibly adding further species to the fauna of the State, that we arranged this visit. Unfortunately a heavy westerly gale was blowing during the two days spent at Yallingup, and still heavier seas were coming in during the three days spent at Ellensbrook, entirely precluding any effective work being done at the latter locality.

The work of the two days spent at Yallingup was carried out under great difficulties, and while the number of specimens taken was in consequence very limited, several forms of exceptional interest were secured, and amongst them the second known specimen of Dr. Torr's *Tonicia hullianus*. The rocks are granitic and suited to the habits of chitons.

My warmest thanks are also due to my colleague, Mr. R. Wilson, of Eden Hills, but for whose able assistance the results would have been much poorer. My stay in that State was prolonged till the next series of low tides, and Geraldton, 306 miles, by rail, north of Perth, and Dongarra, 40 miles to the south of that place, were both visited and the reefs examined for chitons. Unfortunately the rocks in both localities are composed of solid limestone reefs, with rough surfaces, unsuited to the habits of this group of mollusca, consequently very few species were secured, but amongst them, fortunately, were two specimens of a new *Rhyssoplax* which I propose to name *R. Geraldtonensis*, after the locality where it was found.

As a result of the total collecting several species are added to the Western Australian fauna, the range of others greatly extended, and several outstanding problems solved. Altogether nineteen species were collected.

My acknowledgments are due to Dr. Torr for the opportunity of examining his types and the data attached thereto, and to Mr. L. Glauert, of the Western Australian Museum, for the loan of the type of *Lucilina delecta*, Thiele, and other specimens.

Callochiton platessa, Gld.—One small specimen was secured at Yallingup. I have collected this shell in New South Wales, and from there to Western Australia, including Tasmania, and also have specimens from New Zealand, so probably it has the widest range of any of our chitons. The specimen under consideration was adhering to a rock covered with pink calcareous algae; evidently a case of colour protection.

Stenochiton posidonialis, Ashby.—One specimen was taken at Dongarra, living on a stronger form of *Posidonia* than is met with in South Australia. It grew in a fairly sheltered situation inside the reef. The first record of the occurrence of this and the following species in the waters of the Western State is contained in my paper (Jour. and Proc. Roy. Soc. W. Austr., vol. vi., 1920). The present discovery extends its range for nearly 300 miles northwards.

Stenochiton cymodocealis, Ashby.—One specimen was taken on a very fine form of *Cymodocea*, growing in a sheltered situation close to the harbour at Geraldton, thus extending its range for more than 300 miles northwards.

Ischnochiton torri, Ire. and May.—One taken at Yallingup; Torr also recorded it from the same locality.

Ischnochiton virgatus, Reeve.—I found this charming little *Ischnochiton* fairly numerous at Ellensbrook; this is the first published record of its occurrence on the west coast of this State.

Ischnochiton (Haploplax) resplendens, Bed. and Mat.—A nice series of this handsome chiton was obtained on the smooth granitic rocks at Yallingup. Although all were darker in colour than is typical they show the same minute sculpture and highly ornamental markings, consisting of blue spots and varied streaking, that is characteristic of the South Australian shell. They are evidently a larger race, measuring up to 30 × 17 mm.

Ischnochiton (Heterozona) cariosus, Pils.—I found it numerous on the granite rocks at Ellensbrook and Yallingup,

and also collected it on the limestone rocks at Rottnest, Dongara, and Geraldton. Heretofore it has not been recorded further north than Rottnest Island. The northern specimens are much lighter in colour than those from Yallingup, the ground-colour of both being pale "Ochraceous-Buff" (Ridgway's Colour Standards, pl. xv.), slightly flecked with darker streaks. The more southern shells are much more extensively thus flecked, which gives them a greyish look. The reddish form so common in South Australian waters is quite absent. The girdle is banded in a varying degree. The sculpture differs slightly from the eastern shells, the longitudinal ribbing of the pleural area is less regular, and the nodules of the lateral area are coarser and suggest often two nodulose, radiating ribs. Should it be desired to distinguish this western variety, I suggest that it be known as var. *occidentalis*.

Callistochiton meridionalis, Ashby.—This shell was fairly numerous at Yallingup. It was taken by Torr, in 1910, at the same spot, and recorded by him under the name of *C. antiquus*, Reeve (Trans. Roy. Soc. S. Austr., xxxv., 1911, p, 98).

Plaxiphora albida, Blain.—I collected these on limestone rocks both at Cottesloe and Dongarra, in positions exposed to the full force of the waves. Dr. Thiele (Faun. Sudwest Austr., III., 1911, p. 402) records the same shell from Cottesloe under the name of *P. albida*, and I saw in the Western Australian Museum a specimen from that locality so labelled by Dr. Thiele. This form is not the heavily wrinkled one that used to be known by Australian collectors as *P. petholata*, Sow., but in most cases it corresponds with the non-wrinkled shell we used to recognize as *P. glauca*, Quoy and Gaim.

Dr. Torr (in *loc. cit.*, p. 99) identifies this shell as *P. costata*, Blain., and writes as follows:—"Mr. Iredale says, 'Blainville's *costatus* is easily recognizable as the species I have noted as *glauca*, Q. et G.' He agrees with Dr. Thiele, in his Revision des Systems der Chitonen, in placing *P. petholata*, Sow., as *albida* of Blainville, and *P. glauca*, Q. et G., as *costatus*, Blain."

Up to the present I have with some misgivings been following the course adopted by Dr. Torr. I now have a translation of Dr. Thiele's work before me. In it he says, referring to Blainville's type of *Chiton costatus*, which he had before him, that it is "probably the one named *Plaxiphora petholata* by Sowerby (1840); as Blainville's names were published in 1825, *P. costata* is certainly older." He then describes the sculpture as follows:—"The central areas have

at both sides a radial rib above which more or less vertical zig-zag striae are visible." He adds that Blainville's shell "is said to have come from King George Sound." He goes on to give the result of his examination of the type of *Chiton albidus*, Blain., "which originated from King Island, south of Australia." His reference to the sculpture is as follows:— "A definite radial rib is not in evidence, only a blunt ridge, having at one place, in the front, a few zig-zag indentations," and adds, "I was unable to examine the original of *Plaxiphora glauca*, Quoy and Gaim., from Tasmania; according to the drawings it would be possible to class it with the last-named species, though the colour is somewhat different." Without going into the question as to how the mistake occurred, it is quite evident that the words quoted from Dr. Torr's paper transpose Dr. Thiele's statement, and the shell that has been referred to by Torr and quoted by Hedley (in Jour. Roy. Soc. W. Austr., vol. i., 1914-15, p. 23) as *P. costata*, Blain., must in future be designated *P. albida*, Blain.

The shells collected by myself at Cottesloe and Dongarra vary considerably; all but one show a single diagonal rib and some are quite free from wrinkling or notching, but others show a slight wrinkling, and one, if held in a certain light, shows distinct raising of the posterior margin of the central valves, suggesting a second diagonal rib so common in the strongly sculptured specimens of *P. petholata*, Sow., which equals *P. costata*, Blain.

The limit of the present paper prevents the discussion being carried further. Either we have been confusing three species and one sub-species under the name of *P. petholata*, Sow., and *P. glauca*, Quoy and Gaim., or these three forms are referable to one very variable species and possibly one sub-species, *viz.*, *P. conspersa*, Ad. and Ang.

Kopionella matthewsi, Ire.—Three specimens of this interesting shell were found at Yallingup. All show similar "oar-headed spicules" to the South Australian form which was fully described in my paper (Trans. Roy. Soc. S. Austr., vol. xliii., 1919), and a like slight cleft in the girdle behind the tail valve.

The writer has now found members of this genus from eastern Tasmania to the west coast of Western Australia, and in every specimen the strange "oar-headed spicules" are present. All specimens I have collected, even when separated by more than a thousand miles, are invariably furnished with these spicules.

No. 1 specimen, measuring 9 × 6 mm., is similar in method of sculpture to the shells from Marino, in South Australia, and shows the coarsely pustulose radial ribs in the lateral areas, which is so marked a feature in that form.

The tail valve, although thickened at its posterior margin, is not as distinctly upturned.

Nos. 2 and 3 are quite distinct in sculpture; they measure, respectively, 14 × 9 and 13·5 × 6 mm. The last-named, it will be seen, is long and narrow; quite an unusual form for members of this genus.

The lateral areas in these two are almost smooth, with the exception of the second valve, which in specimen No. 2 gives some evidence of diagonal ribs; in No. 3 a few large nodules are present.

These two specimens suggested affinities with Torr's *Plaxiphora hedleyi*, and so I took the earliest opportunity of visiting the Doctor, who, with his usual kindness, allowed me to make careful examination of his types. I find that the shells I have called 2 and 3 are undoubtedly his species, designated under the name *Plaxiphora hedleyi* (Trans. Roy. Soc. S. Austr., vol. xxxv., 1911, p. 103). I also find that Dr. Torr's *Plaxiphora zebra*, described in the same paper (p. 106) from a single median valve, is similar in sculpture to my specimen No. 1, and corresponds with the South Australian shell known as *K. matthewsi*, Ire. Prior to 1910 Australian collectors used to refer to this shell as *Plaxiphora conspersa*, Ad. and Ang. In June of that year Iredale described it under the name of *P. matthewsi*.

Seeing that Dr. Torr's paper was read in October, 1911, his *P. zebra* becomes a synonym of Iredale's shell. Although it is possible that there is only one very variable species in the waters of South Australia and Western Australia, which the finding of these three shells, above described, in the same hole at the same time, rather supports, I prefer for the present to retain Torr's name as *hedleyi*, as a sub-species of *Kopionella matthewsi*, Ire., and represented by the forms I have herein described as Nos. 2 and 3, with almost smooth lateral areas. The delicate and remarkable "oar-head spicules," which suggested to me the name of the genus, were no doubt removed from Torr's specimen in rough handling in the cleaning.

The tail valve, as shown in Torr's fig. 2E, is a little misleading, the part of that valve behind the mucro is really the thickened edge of the upturned portion; neither is the slight indentation of the girdle behind the mucro indicated in his fig. 2A.

Acanthochiton kimberi, Torr.—I am glad to be able to add this somewhat rare *Acanthochiton* to the fauna of Western Australia. Two specimens in an excellent state of preservation were secured at Yallingup; they show none of the erosion which so often mars the shells of this species. The nearest locality from which this species has heretofore been taken is St. Francis Island, in South Australia, so that the extension of its range to the west coast of Western Australia is very interesting.

Acanthochiton (Notoplax) sub-viridis, Torr.—This interesting shell was described by Torr *(loc. cit.)* from specimens taken by himself at Albany, on the south coast. We have now taken it on the west coast, at Yallingup; the onlv previous specimens known were those taken by Torr at Albany.

Rhyssoplax torrianus, Hed. and Hull.—A nice series were taken at Yallingup, where Dr. Torr also took it in 1910.

Onithochiton scholvieni, Thiele.—This large *Onithochiton* was common on the face of the exposed reef at Dongarra, making it difficult to get with the surf breaking over them; it adhered very tightly to the hollows in the fretted limestone reef. I believe it has not before been recorded further north than the neighbourhood of Perth.

Liolophura georgiana, Quoy and Gaim.—This species was very common on the rocks that were fully exposed at low tide at Ellensbrook, Yallingup, Cottesloe, and Dongarra. The larger specimens were always more or less eroded. Small specimens, on the other hand, are beautifully sculptured.

On examining Torr's type of *Plaxiphora pustulosa*, described from one median valve only *(loc. cit.*, p. 107), the presence of "eyes" in the lateral areas was at once apparent, and suggested its true nature. On comparing it with a well-preserved example of similar age of *L. georgiana*, its identity with it was evident; Torr's example is probably valve No. 5 of that species.

Had Dr. Torr seen the whole shell the mistake, of course, would never have occurred. The accident is not without its compensating features, for I believe no recent first-class figure exists of this shell, so Torr's excellent drawing of the median valve *(loc. cit.*, pl. xxv., fig. 7) under the name *Plaxiphora pustulosa* will always be of use to collectors.

Crytoplax striatus, Lamark.—One specimen only from the east side of Rottnest Island. The only other record of this common eastern species is that given by Dr. Torr, who took it at Hopetoun and Yallingup.

Cryptoplax hartmeyeri, Thiele.—One specimen taken at Yallingup and measuring 12 mm. long was quite new to me. It does not fully agree with Dr. Thiele's figure accompanying his description of the foregoing species (Faun. Sudwest Austr., III., 1911, p. 405, pl. 6, f. 11-17, Shark Bay). The sculpture is more bead-like and the spicules on the girdle are widely spaced and short and thick, quite different from the thickly-set, hair-like spicules of *C. gunni*, Reeve, or the massed, coarse, curved spicules of *C. striatus*, Lamark. As Dr. Thiele's specimen was fully three times the size, the bead-like character may have been somewhat impaired. The examination of more material may alter this determination, but, for the present, I propose to refer the species under review to Dr. Thiele's species.

Tonicia hulliana, Torr.—This very distinct species has heretofore only been represented by the type specimen, a well-preserved adult shell, collected by Dr. Torr, at Ellensbrook, and described by him *(loc. cit.*, p. 104, pl. 25, f. 4). It was my fortune to find a single specimen of this hitherto unique chiton, measuring, dry, 6·5 × barely 4 mm. It was quite new to me, being apparently smooth and of a delicate pink colour; a few eyes were then noticed in the lateral areas and end valves, and I, at first, thought it must be referred to Dr. Torr's shell, but on turning up the description and figure I found that the sculptural characters figured and described by him were absent, and that almost the only feature present in mine was quite distinct from his, and concluded that, while it certainly was a *Tonicia*, or rather that division thereof known as *Lucilina*, with posterior mucro, it must be an undescribed form. Later Dr. Torr, with his usual kindness, forwarded me his type of *(Tonicia) Lucilina hulliana*, when I discovered that he had overlooked the juvenile features, which consist of a number of pits in the pleural area immediately abutting on the anterior margin of the lateral areas, high up on the back. The type has about seven of these clearly visible on most of the valves, if held at the right angle of light. Both specimens are carinated, and I think the statement in the description, "Back rounded, side slopes curved," may therefore be a little misleading. The sculpture of the adult form, correctly described by Torr as "concentric growth-lines running from lateral into pleural and dorsal areas," and the "5 or 6 irregular flattened ribs" in the lateral areas, are absent in the juvenile form, although there is a suggestion that these forms of sculpture are about to commence. We have therefore in this species a very excellent example of the wide difference that exists between the sculpture of

juvenile chitons and their adult form, a fact I have pointed out in several of my papers. In this case the juvenile method of sculpture is dropped immediately the adult characters begin to appear.

Lucilina delecta, Thiele (Faun. Sudwest Austr., III., 1911, p. 397).—While I did not myself take a specimen of this shell, through the kindness of Mr. L. Glauert, of the Western Australian Museum, I have had the opportunity of comparing specimens "obtained on pearl-shell" from Shark Bay with Dr. Thiele's type, which is in the Western Australian Museum, and I find them the same species. As Dr. Thiele does not figure the shell, I include one in the plate accompanying this paper.

I am indebted to Mr. Nils. H. J. Odhner for a specimen of the shell collected by Dr. E. Mjoberg, of the Swedish Scientific Expedition, 1910-1913, and identified and recorded in Kun. Sve. Vet. Hand. Band. 52, No. 16, p. 12, as *Tonicia truncata*, Sow., from Broome. I find this shell agrees with Dr. Thiele's species. I have been unable to see compared specimens of Sowerby's shell or of Reeves' *T. picta*, now *Lucilina shirleyi*, Ire., but Pilsbry's drawing of this latter shows decided differences between that and Thiele's shell; on the other hand, Pilsbry's drawing of Sowerby's *T. truncata* will fit equally the Broome and the Shark Bay shells—in both the girdle encroaches on the valves, which is said not to be the case in *T. picta*, Reeve.

For the present I am not able to decide the question as to whether Dr. Thiele's *L. delecta* is the same as Sowerby's *T. truncata*, or whether the identification of the shell obtained by Dr. Mjoberg, at Broome, as such, is incorrect; it is quite certain that one or the other name must be withdrawn from our Australian list.

Rhyssoplax geraldtonensis, n. sp.

Two specimens, one adult and the other juvenile, were obtained on the reef, Back Beach, Geraldton, November 7, 1920.

General appearance.—Shell strongly carinated, side slopes steep, slightly rounded, lateral areas much raised and bi-ribbed, pleural areas longitudinally grooved, general colour dirty ivory-white mottled with pale brown, polished surface, girdle banded.

Anterior valve.—The apex and nearly half the valve smooth, the rest radially ribbed, which ribs are broken with concentric grooving. I counted eighteen ribs.

Posterior valve.—Mucro slightly posterior and much raised, dorsal area broad and smooth, anterior portion longitudinally ribbed, similarly to the pleural areas in the median valves. Posterior portion of valve margined by a raised, nodulose rib, the portion of valve immediately behind the mucro smooth, posterior portion decorated by radial ribs broken into two or three nodules by deep concentric sulci, the posterior portion of valve slightly recurved.

Median valve.—Dorsal area slightly beaked, broad and smooth, lateral areas much raised, composed of two rather flattened, nodulose ribs separated by a broad groove; in valve 2 there is slight evidence of two of these grooves. Pleural area broken into flat, longitudinal ribs, separated by deep grooves, those next the dorsal area only traversing part of the area. I counted ten of these grooves in some valves.

Girdle.—Clothed with highly-polished, flattish, pebble-like scales, with rounded apices. There is no sign of fluting or ribbing on these scales, but under a high power there is some evidence of parallel scratching.

Measurements.—The dry specimen measures 20×11 mm.

Habitat.—On the underside of loose limestones buried deeply in sand, in holes in the solid limestone reef at Geraldton.

Juvenile shell.—Measuring 9×5 mm., three longitudinal grooves are present in the pleural area, the nodulose character of the lateral areas is only in evidence in the outer half. A juvenile shell of half this size will therefore have unsculptured pleural and lateral areas, but the latter area will be distinctly raised. The anterior valve is practically without sculpture, with the exception of the very fine decussate pattern that covers the whole shell, probably due to the megalopores.

Comparisons.—While at first sight this shell, with its polished ivory-like appearance, seems very different from *R. tricostalis*, Pils., its method of sculpture approaches that form. The ribs in the pleural area are less raised and further apart than is the case in that species, and suggest weather-boarding rather than the narrow well-raised ribs, separated by deep grooves of *R. tricostalis*. The lateral areas are divided into two ribs, instead of three, and the nodules are more rounded and flatter. The scales, both in shape and lack of grooving, are of a different character. *R. verconis*, Torr and Ashby, which is somewhat kindred in sculpture, has erect, pointed scales, of the same type as *R. jacksonensis*, Ashby. Then, again, the habit of this species in adhering to the underside of limestone rocks buried deeply in sand is very distinct from

R. tricostalis, which loves the exposed sides of clean hard rocks.

In conclusion.—It will be seen by the foregoing that the following must be added to the Western Australian fauna:—*Acanthochiton kimberi*, Torr; *Kopionella matthewsi*, Ire.; and *Rhyssoplax geraldtonensis*, Ashby. That the following must be removed from that list, *viz.*:—*Plaxiphora hedleyi*, Torr, which become a subspecies of *Kopionella matthewsi*, Ire.; *Plaxiphora zebra*, Torr, becomes a synonym of the same species; and *Plaxiphora pustulosa*, Torr, becomes a synonym of *Liolophura georgiana*, Quoy and Gaim. *Plaxiphora costata*, Blain., is replaced by *Plaxiphora albida*, Blain.; *Lucilina delecta*, Thiele, either is replaced by *Tonicia truncata*, Sow., or the record of the occurrence of that shell at Broome, quoted in my paper (Trans. Roy. Soc. S. Austr., vol. xliv., 1920, p. 291), collected by Dr. Mjoberg, must be altered to *Lucilina delecta*, Thiele.

One other correction must be made. Dr. Torr *(loc. cit.*, p. 98) records the occurrence of *Chiton exoptanda*, Bednall, on the strength of "one anterior valve and one median valve, were taken from 20 fathoms in Geographe Bay."

Through the kindness of Dr. Torr I have had the opportunity of examining these valves, and find that the anterior valve has "eyes" and is possibly a worn valve of *Lucilina hulliana*, Torr, and the median valve cannot be identified with *C. exoptanda;* the most that can be said is, that if the characteristic sculptural features of that shell were ever present they have been so worn off as to make determination impossible. The colour approximates very closely to *exoptanda*.

DESCRIPTION OF PLATE VIII.

Fig. 1. *Rhyssoplax geraldtonensis*, Ashby, ×5½.
,, 2*a*. *Tonicia (Lucilina) delecta*, Thiele, posterior valve, ×6.
,, 2*b*. ,, ,, ,, ,, median valve, ×6.
,, 2*c*. ,, ,, ,, ,, anterior valve, ×6.